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ABSTRACT

The Mathematics Improvement Component (MIC) was implemented in the Columbus (Ohio) Public Schools in 1987-88 to improve the skills and achievement levels of pupils who were low achievers in mathematics. Three programs comprised MIC: the Elementary Program, the Middle School Program, and the Middle School Pilot Program. In the first two (nonpilot) programs, selected pupils were served in computer-assisted instruction (CAI) labs. The MIC-Pilot program teachers used a variety of instructional methods. The MIC-CAI programs served 883 pupils in grades two through six for an average of 3.6 hours of instruction per week. Analysis of the Comprehensive Tests of Basic Skills (CTBS) Total Mathematics scores indicated an average growth of 16.0 normal curve equivalent (NCE) points for the 6.2 month instructional period. The amount of NCE change varied inversely with grade level. The MIC-Pilot program served 210 pupils in grades six and seven for an average of 1.8 hours of instruction per week. Analysis of the CTBS Total Mathematics scores indicated an average growth of 14.6 NCE points for the same period. Three inservice meetings were rated highly by program teachers. Three recommendations were suggested for each program. Tables and instruments are provided in the appendices. (YP)

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Education Consolidation and Improvement Act - Chapter 1

FINAL EVALUATION REPORT
MATHEMATICS IMPROVEMENT COMPONENT:
ELEMENTARY PROGRAM, MIDDLE SCHOOL PROGRAM,
AND MIDDLE SCHOOL PILOT PROGRAM

July 1988

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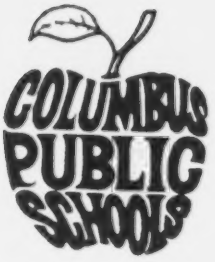

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Education Consolidation and Improvement Act - Chapter 1

FINAL EVALUATION REPORT
MATHEMATICS IMPROVEMENT COMPONENT:
ELEMENTARY PROGRAM, MIDDLE SCHOOL PROGRAM,
AND MIDDLE SCHOOL PILOT PROGRAM
1987-88

ABSTRACT

Program Descriptions: The Mathematics Improvement Component (MIC) was implemented in the Columbus Public Schools in 1987-88 to improve the skills and achievement levels of pupils who were low achievers in mathematics.

Three programs comprised MIC: the Elementary Program, the Middle School Program, and the Middle School Pilot Program. In the first two (nonpilot) programs, selected pupils were served in computer-assisted-instruction (CAI) labs. The MIC-CAI program teachers provided individual and small-group instruction according to pupil needs. Selected pupils normally were served in groups of 8 for approximately 40 minutes per day for the entire school year. In the MIC-Pilot program selected pupils were allowed to move in and out of the program as needed. Need was determined by pupil performance on formative tests administered at the end of each chapter by the classroom teacher. Intervention followed. The MIC-Pilot program teachers used a variety of instructional methods. Pupils were periodically retested on the Columbus Course of Study (COS) objectives that were not mastered on the classroom chapter test. MIC-Pilot pupils initially were to be served in groups of 5 for approximately two 40-minute classes in a six-school-day cycle. In actual practice MIC-Pilot pupils normally were served an average of 2.5 class periods per week.

In 1987-88 the MIC programs were located in a total of 33 schools. Of these, the Elementary Program served 22 schools, the Middle School Program served 7 schools, and the Middle School Pilot Program served 4 schools.

Time Intervals: For evaluation purposes the MIC programs started on September 28, 1987 and continued through April 15, 1988. This interval of time gave 123 days of possible program instruction. For the two MIC-CAI programs, pupils included in the final pretest-posttest analyses must have attended at least 98 days (80%) of the 123 day period. For the MIC-Pilot program, pupils must have been enrolled for a minimum of 20 instructional days and attended 80% of their individual instructional periods.

Activities: Implementation of the MIC programs was accomplished through instructional activities to strengthen and extend regular classroom instruction. Instructional techniques and materials based on skill-centered objectives and coordinated with the Columbus Course of Study (COS) objectives were designed to fit individual pupil needs.

Achievement Objectives: For the MIC-CAI programs, the average mathematics growth for the pupils who attended the program at least 80% of the instructional period will be 1.0 normal curve equivalent (NCE) point for each month of instruction. For the MIC-Pilot program, the average mathematics growth for all pupils who were enrolled at least 20 days and who attended the program at least 80% of their individual instructional periods will be 1.0 normal curve equivalent (NCE) point for each month of instruction. Growth will be measured by a nationally standardized achievement test of mathematics.

Evaluation Design: The major evaluation effort was accomplished through the administration and analyses of the two mathematics subtests of the Comprehensive Tests of Basic Skills (CTBS, 1981). Analyses of pretest-posttest achievement data were primarily in terms of NCE points. Locally-developed forms were used to collect pupil census, teacher census, parent involvement, and inservice evaluation information for the three MIC programs. In addition, computer census information was collected for the two MIC-CAI programs.

Major Findings/Recommendations: Major findings and recommendations are presented separately for the MIC-CAI programs and the MIC-Pilot program.

MIC-CAI programs. Analyses of pupil census data indicated that the MIC-CAI programs served 883 pupils in grades 2-6 for an average of 3.6 hours of instruction per week. Of the 883 pupils, 701 were in elementary schools and 182 were in middle schools. The average daily membership in the programs was 761.1 pupils. The average days of enrollment per pupil was 106.0 days and the average attendance per pupil was 97.1 days. The average number of pupils served during the school year by each half-time MIC-CAI teacher was 28.5.

The attendance criterion was met by 624 pupils, which was 70.7% of the 883 pupils served. The evaluation sample consisted of the 554 pupils in grades 3-6 who met the attendance criterion, took the pretest and posttest, and were English-speaking. This number represented 62.7% of the 883 pupils served. None of the pupils in grade 2 met all of the above criteria.

Analyses of the CTBS Total Mathematics scores indicated an average growth of 16.0 NCE points for the 6.2 month instructional period between pretest and posttest, or 2.6 NCE points per month of instruction. The average growth in the MIC-CAI programs, and in each grade level represented in the evaluation sample, exceeded the achievement objective of 1.0 NCE point for each month of instruction. The amount of NCE change varied inversely with grade level.

The information on the Teacher Census Forms indicated that the MIC-CAI programs were staffed with 31 teachers. All 31 teachers served half-time in a MIC-CAI program (15.5 FTEs) and half-time in a CLEAR-CAI (reading) program.

Analyses of parent involvement data indicated a total of 1626.0 contacts during the school year with 586 different parents of program pupils. The number of contacts and hours varied by month. Individual parent conferences accounted for more parent contacts than any other activity.

The three inservice meetings that were evaluated were rated highly by program teachers on the Inservice Evaluation Forms. The average responses to the four inservice statements ranged from 4.3 to 4.5 on a 5-point scale.

The information collected from program teachers on the Computer Census Forms indicated that most of the elementary CAI labs were equipped with Apple microcomputers serviced by the Prescription Learning Company. Most of the middle school CAI labs were equipped with Dolphin minicomputers. On the average, pupils spent 45.1% of their program instructional time at the computer stations. This average was much higher for the few labs that were equipped with CCC or Wasatch computers than for the majority of labs as described above.

Based on evaluation results, it is strongly recommended that the MIC-CAI programs be continued during the 1988-89 school year. It is further recommended that: (a) variations in program implementation (e.g., instructional methods, computer equipment, percent of pupil time at the computer stations) be studied across schools to determine ways of further improving program effectiveness and efficiency; (b) in 1988-89 efforts be made to improve the NCE growth in the upper grade levels, even though the 1987-88 average NCE growth per month of instruction in each grade level in the evaluation sample exceeded the achievement objective, because the largest gains were made at the lower grade levels; and (c) comparisons of pupil performance in the MIC-CAI programs vs. pupil performance in the MIC-Pilot program be made in the future. Such comparisons are currently problematic because the programs differ on a number of variables. It would be difficult to attribute differences in pupil performance to any specific variable(s). Staff members should be encouraged to review and suggest modifications in the proposed ECIA Chapter 1 program design within the Mathematics Improvement Component to enable valid comparisons of pupil performance.

MIC-Pilot program. Analyses of pupil census data indicated that the MIC-Pilot program served 210 pupils in grades 6-7 for an average of 1.8 hours of instruction per week. The average daily membership in the program was 88.5 pupils. The average days of enrollment per pupil was 51.9 days and the average attendance per pupil was 41.9 days. The average number of pupils served during the school year by each full-time MIC-Pilot teacher was 52.5.

The enrollment and attendance criteria were met by 148 pupils, which was 70.5% of the 210 pupils served. The evaluation sample consisted of the 129 pupils in grades 6-7 who met the enrollment and attendance criteria, took the pretest and posttest, and were English-speaking. This number represented 61.4% of the 210 pupils served.

Analyses of the CTBS Total Mathematics scores indicated an average growth of 14.6 NCE points for the 6.2 month instructional period between pretest and posttest, or 2.4 NCE points per month of instruction. The average growth in the MIC-Pilot program, and in each grade level served, exceeded the achievement objective of 1.0 NCE point for each month of instruction.

The information on the Teacher Census Forms indicated that the program was staffed with 4 teachers. All served full-time in the program.

Analyses of parent involvement data indicated a total of 177.0 contacts during the school year with 98 different parents of program pupils. The number of contacts and hours varied by month. Individual parent conferences accounted for more parent contacts than any other activity.

The three inservice meetings were rated highly by program teachers on the Inservice Evaluation Forms. The average responses to the four inservice statements ranged from 4.8 to 4.9 on a 5-point scale.

Based on evaluation results, it is strongly recommended that the MIC-Pilot program be continued during the 1988-89 school year. It is further recommended that: (a) variations in program implementation (e.g., selection procedures, service delivery patterns, instructional methods, communication with classroom teachers, testing procedures) be studied across schools to determine ways of further improving program effectiveness and efficiency; (b) the movement in and out of the program be determined; and (c) comparisons of pupil performance in the MIC-Pilot program vs. pupil performance in the MIC-CAI programs be made in the future. [See recommendation c (above) for the MIC-CAI programs.]

Education Consolidation and Improvement Act - Chapter 1

FINAL EVALUATION REPORT
MATHEMATICS IMPROVEMENT COMPONENT:
ELEMENTARY PROGRAM, MIDDLE SCHOOL PROGRAM,
AND MIDDLE SCHOOL PILOT PROGRAM

July 1988

Program Descriptions

The Mathematics Improvement Component (MIC) was implemented in the Columbus Public Schools in 1987-88 to assist elementary and middle school pupils who were low achievers in mathematics. The overall purpose of MIC was to improve the mathematics skills and levels of achievement of pupils selected for service in priority schools.

Funding for MIC was provided by Chapter 1 of the Education Consolidation and Improvement Act (ECIA). Prior to MIC, the Basic Math Improvement Program (BMIP) operated in the Columbus Public Schools from 1966 to 1982 with funding from Title I of the Elementary and Secondary Education Act.

Three programs comprised the Mathematics Improvement Component: the Elementary Program, the Middle School Program, and the Middle School Pilot Program. In the first two (nonpilot) programs, selected pupils were served daily in computer-assisted-instruction (CAI) labs. The MIC-CAI program teachers delivered individual and small-group instruction, and pupils normally were served for the entire school year. In the MIC-Pilot program a variety of instructional methods was used. Pupils selected for service in the pilot program were allowed to move in and out of the program as needed during the school year. Instruction was provided several class periods per week.

All three MIC programs included ongoing diagnosis of mathematics problems and assessment of pupil progress based on the cooperative efforts of the program teacher and the classroom teacher. Program planning was accomplished in cooperation with the mathematics personnel of the school district, and instruction was coordinated with the Columbus Course of Study (COS). Program teachers received support from a program coordinator and inservice meetings.

In 1987-88 the MIC programs were located in a total of 33 schools. Of these, the Elementary Program served 22 schools, the Middle School Program served 7 schools, and the Middle School Pilot Program served 4 schools.

In this report the two computer-assisted-instruction programs (MIC-CAI) generally are treated as one and they are discussed separately from the pilot program (MIC-Pilot). However, the MIC programs are treated as a whole for the purpose of discussing certain features that are common to all three programs (e.g., aspects of the evaluation design). The MIC programs are described in more detail below.

Elementary and Middle School Programs (MIC-CAI)

Each MIC-CAI program teacher was located in a computer-assisted-instruction (CAI) lab equipped with microcomputers or minicomputers. The teacher was

provided instructional materials, software, and a computer-management system. An instructional aide generally was assigned to each elementary lab. Instruction was individualized to meet the needs of each pupil.

The lab was used approximately a half-day each for the MIC-CAI program and the Compensatory Language Experiences and Reading (CLEAR-CAI) program. The teacher served half-time in each program. Evaluation of the CLEAR-CAI program is available in a separate report (Lore & Chamberlain, 1988).

Selected pupils normally received instruction in groups of 8 for approximately 40 minutes per school day for the entire school year. According to the program guidelines, each teacher could serve a maximum of 30 pupils during the half-day the lab was used for MIC-CAI instruction. Scheduling arrangements may have varied from school to school.

In 1987-88 the Elementary and Middle School Programs (MIC-CAI) served selected pupils in grades 2-6 in 29 buildings. Of the 29 buildings, 22 were elementary schools and 7 were middle schools. Program staff consisted of 31 teachers. With the exception of 2 elementary schools, each building was staffed by 1 program teacher. Two elementary schools were each staffed by 2 program teachers.

Middle School Pilot Program (MIC-Pilot)

A key feature of the MIC-Pilot program was the flexibility to move selected pupils in and out of the program as needed during the year. Need was determined by pupil performance on formative tests administered at the end of each chapter by the classroom teacher. The tests reflected the textbook and the Columbus Course of Study (COS) objectives. Intervention followed. After pupils received instruction they were retested periodically on the COS objectives that were not mastered on the classroom chapter test.

According to the program guidelines, pupils were to receive instruction in groups of 5 for approximately two 40-minute classes in a six-school-day cycle. Approximately 25 students could be served during 5 periods per day by each teacher. Each teacher could serve a total of approximately 60 pupils throughout the year.

In actual practice two patterns of service delivery were implemented within the MIC-Pilot program. In the first, pupils normally received instruction 2-3 class periods per week (e.g., Monday and Wednesday, or Tuesday and Thursday, plus every other Friday). In the second pattern pupils normally received instruction daily in alternating weeks (i.e., 5 class periods during one week and no instruction the following week). With both patterns of service delivery, pupils were served an average of 2.5 class periods per week. The length of a class period varied from school to school and ranged from 42-45 minutes.

In 1987-88 the Middle School Pilot Program (MIC-Pilot) served selected pupils in grades 6-7 in 4 buildings. Program staff consisted of 4 full-time teachers, 1 teacher per school.

Evaluation Objectives

The evaluation objectives for the MIC programs were as follows:

Elementary and Middle School Programs (MIC-CAI)

The average mathematics growth for the pupils who attended the program at least 80% of the instructional period will be 1.0 normal curve equivalent (NCE) point for each month of instruction. Growth will be measured by a nationally standardized achievement test of mathematics.

Middle School Pilot Program (MIC-Pilot)

The average mathematics growth for all pupils who were enrolled at least 20 days and who attended the program at least 80% of their individual instructional periods will be 1.0 normal curve equivalent (NCE) point for each month of instruction. Growth will be measured by a nationally standardized achievement test of mathematics.

The program time period established for evaluation purposes for all three MIC programs was 123 school days beginning September 28, 1987, and ending April 15, 1988. This time period (123 days divided by an average of 20 school days per month) is equal to 6.2 months of possible instruction. For the MIC-CAI programs, analysis of pretest-posttest performance was contingent on pupil attendance for 98 days (80%) of the 123 day period. For the MIC-Pilot program the analysis was contingent on pupil enrollment for a minimum of 20 instructional days and pupil attendance for 80% of their individual instructional periods.

Evaluation Design

The evaluation design for the MIC programs provided for the collection of data in five areas of operation. The instruments used to collect the data are found in Appendix B, with the exception of the standardized achievement tests.

1. ECIA Chapter 1 Pupil Census Information

   A locally-developed Pupil Census Form was completed by program teachers for each pupil served to provide the following information: days of program enrollment, days of program attendance, and hours of instruction per week. The form also included information regarding the pupil's grade and sex, whether or not the pupil was non-English speaking, and whether or not the pupil left the ECIA Chapter 1 program because he or she qualified for a special education program. Also included was a question regarding the pupil's progress which required a subjective response from the program teacher. Collection of these forms was completed in May 1988.

2. Standardized Achievement Test Information

   Program pupils were administered the two mathematics subtests of the Comprehensive Tests of Basic Skills (CTBS, 1981). The two subtests, Mathematics Computation, and Mathematics Concepts and Applications, yield a combined score for Total Mathematics. This test series, which is published by CTB/McGraw-Hill, has empirical norms for fall and spring,

established October 6-10, 1980, and April 27 to May 1, 1981. The forms, subtests, and test levels used for each grade level are listed below.

		Pretest			Posttest		
Grade	Test	Form	Level	Subtest	Form	Level	Subtest
2	CTBS	U	D	Total Mathematics	V	D	Total Mathematics*
3	CTBS	U	E	Total Mathematics	V	E	Total Mathematics
4	CTBS	U	F	Total Mathematics	V	F	Total Mathematics*
5	CTBS	U	G	Total Mathematics	V	G	Total Mathematics
6	CTBS	U	G	Total Mathematics	V	G	Total Mathematics
7	CTBS	U	H	Total Mathematics	V	H	Total Mathematics*

Note. Total Mathematics was comprised of two subtests: Mathematics Computation, and Mathematics Concepts and Applications.
*Estimated by administration of customized Form V

All testing was done on level. At posttest time, grades 2, 4, and 7 were administered customized tests that provided norm-referenced as well as criterion-referenced scores. The customized tests were developed by Columbus Public Schools personnel in cooperation with CTB/McGraw Hill to match the Columbus Public Schools Graded Course of Study.

The achievement tests were administered as follows: Program teachers in grades 2-7 normally administered the pretest except in schools where Schoolwide Testing occurred. Posttests for grades 2-7 were administered as part of Districtwide Testing. During Schoolwide or Districtwide Testing, tests were administered by classroom teachers with program teachers serving as proctors. Pretesting occurred during the week of September 21-25, 1987; posttesting occurred April 18-22, 1988.

3. ECIA Chapter 1 Teacher Census Information

The locally-developed Teacher Census Form was designed to provide information regarding characteristics of program personnel. Collected information included total years of teaching experience, years of Title I/Chapter 1 teaching experience, and the highest college degree received. The form was completed by Chapter 1 program teachers in September 1987.

4. Parent Involvement Information

The Parent Involvement Survey was constructed locally to collect data on the nature and level of parent involvement in ECIA Chapter 1 programs. Program teachers reported data on a monthly basis, September 1987 through June 1988, and at the end of the school year. Monthly data included the number of program parents involved in five categories of parent involvement, the total number of hours program parents were involved, and a monthly unduplicated count of the number of program parents involved. End-of-school-year data included an annual unduplicated count of the number of program parents involved and information about the involvement of nonprogram parents. The latter included an estimate of the number of nonprogram parents involved in the five categories of parent involvement and the total number of hours nonprogram parents were involved.

5. Inservice Evaluation Information

The locally-developed General Inservice Evaluation Form was designed to obtain teacher perceptions regarding the effectiveness of each inservice session and to provide feedback to program administrators. The form was distributed to participants at the close of inservice sessions held for Chapter 1 staff members. A modified version of the form was used for the Opening Conference for Chapter 1 teachers on September 8, 1987. Dates and topics of inservice meetings for MIC teachers conducted by Chapter 1 are shown in Table 1. Teachers completed inservice evaluation forms for all of the inservice meetings except for one meeting on September 30, 1987.

Table 1

Program Teacher Participation in MIC Inservice Meetings
by Date and Topic
1987-88

Date	Title of Inservice	Program		
		Elementary MIC-CAI	Middle School MIC-CAI	Middle School MIC-Pilot
September 8	Opening Conference for Chapter 1 Teachers	X	X	X
September 30	Math Inservice		X[a]	
October 21	Mathematics Workshop		X	X
December 4	Using Manipulatives to Teach Mathematical Concepts		X	X

[a]This meeting was not evaluated.

Teachers jointly serving in a MIC-CAI (mathematics) program and a CLEAR-CAI (reading) program participated in other Chapter 1 inservice meetings pertaining to reading, computers, and related topics. Dates and topics of these sessions are not included in this report but are contained in the final evaluation report for the CLEAR Program (Lore & Chamberlain, 1988).

6. Computer Census Information

In addition to the five kinds of data specified in the evaluation design, information on computer usage was obtained for the MIC-CAI programs. The locally-constructed questionnaire, informally referred to as the Computer Census Form, served two purposes: to delineate and describe the various computer systems used in all CAI labs, and to determine the percent of program time that pupils worked at the computers in the different computer systems. Data collected from this instrument have been summarized in an interim evaluation report (Chamberlain, 1988) and the data pertaining to the MIC-CAI programs are also included in this report.

Major Findings

Elementary and Middle School Programs (MIC-CAI)

Pupils were selected for the MIC-CAI programs on the basis of previous achievement test scores which indicated they were achieving at or below the 36th percentile in mathematics skills. Selection testing occurred prior to the program pretest.

Pupil Census Information. During the 1987-88 school year the MIC-CAI programs served a total of 883 pupils in grades 2-6 for an average of 3.6 hours of instruction per week. Of the 883 pupils, 701 were in the elementary program (grades 2-5) and 182 were in the middle school program (grade 6).

The average daily membership in the MIC-CAI programs was 761.1 pupils. The average days of enrollment per pupil was 106.0 days, and the average attendance per pupil was 97.1 days. The average number of pupils served during the school year per teacher by the 31 half-time MIC-CAI teachers was 28.5, although the average number of pupils enrolled per teacher on any given day was 24.6 (average daily membership divided by 31 teachers). The attendance criterion was met by 624 pupils, or 70.7% of all program enrollees. Data pertaining to enrollment and attendance are presented in Table 2.

The evaluation sample was limited to those pupils who were English-speaking, had both pretest and posttest administrations of the standardized achievement test, and met the attendance criterion of at least 80% (98 days) of the 123 program days.

Of the 883 pupils served, 1 (0.1%) was non-English speaking. An additional 328 were excluded from the evaluation sample due to incomplete test data and/or nonattainment of the attendance criterion. The evaluation sample was comprised of the remaining 554 pupils in grades 3-6, which was 62.7% of the 883 pupils served. None of the pupils in grade 2 met all of the above criteria. Data from testing are presented in Tables 3 and 4.

Pupil census information also included the teacher's judgment of individual pupil progress as much, some, little, or no progress. Of the 883 pupils served in the program 286 (32.4%) were perceived by their program teachers as making much progress, 436 (49.4%) as making some progress, 134 (15.2%) as making little progress, and 27 (3.1%) as making no progress.

Table 2

Number of Pupils Served; Averages for Days of Enrollment,
Days of Attendance, Daily Membership, and Hours of Instruction Per Week;
and Pupils Meeting Attendance Criterion for MIC-CAI Programs
Reported by Grade Level
1987-88

Grade	Pupils Served	Girls	Boys	Average				Pupils Meeting Attendance Criterion
				Days of Enrollment	Days of Attendance	Daily Membership	Hours of Instruction per Pupil per Week	
2	2	0	2	88.5	81.5	1.4	3.8	1
3	139	75	64	98.6	90.6	111.4	3.5	91
4	280	154	126	110.7	101.9	252.0	3.7	219
5	280	129	151	105.8	97.1	240.9	3.6	190
6	182	79	103	105.0	94.7	155.4	3.6	123
Total	883	437	446	106.0	97.1	761.1	3.6	624

Standardized Achievement Test Information. Normal curve equivalents (NCEs) are generally considered to provide the truest indication of pupil growth in achievement because they provide comparative information in equal units of measurement. Data for normal curve equivalents are presented in Table 3. The average NCE change from pretest to posttest for the MIC-CAI programs was 16.0 NCE points. The average NCE change per month in the 6.2 month instructional period between pretest and posttest was 2.6 NCE points, which exceeded the evaluation objective for mathematics of 1.0 NCE point for each month of instruction. Moreover, the evaluation objective was exceeded in each grade represented in the evaluation sample, although the amount of change varied inversely with grade level. More specifically, the average mathematics growth in grade 3 was 21.4 NCE points overall, or 3.5 NCE points per month; whereas the growth in grade 6 was 7.2 NCE points overall, or 1.2 NCE points per month (see Table 3).

It should be kept in mind that NCEs are based on percentiles, which compare the pupil's performance in relation to the general population. No change in NCE score from pretest to posttest does not denote a lack of absolute progress; on the contrary it means that over the school year the pupil has progressed at the expected rate of growth and has maintained the same relative position in terms of the general population. Even a small gain in NCEs indicates an advancement from the pupil's original position relative to the general population. For readers interested in percentile and grade equivalent statistics, see Tables A-1 and A-2 in Appendix A.

Table 4 contains data related to the changes in NCE scores for the three ranges: (a) no improvement in NCE scores (0.0 or less), (b) some improvement in NCE scores (0.1 to 6.9), and (c) substantial improvement in NCE scores (7.0 or more). The data indicate that 465 pupils (83.9%) made gains in NCE scores. This means that 83.9% of the pupils in the evaluation sample progressed at a rate that was greater than expected for them. More specifically, 395 pupils (71.3%) made substantial improvement; 70 pupils (12.6%) made some improvement; and 89 pupils (16.1%) made no improvement, as evidenced by a gain of 0.0 or a decline in NCE scores.

ECIA Chapter 1 Teacher Census Information. Teacher Census Forms were completed in September 1987 by the 31 teachers assigned to the MIC-CAI programs. All 31 program teachers were full-time employees of the Columbus Public Schools serving half-time in a MIC-CAI (mathematics) program and half-time in a CLEAR-CAI (reading) program. Of the 31 teachers, 24 were assigned to elementary schools and 7 were assigned to middle schools. Thus, in terms of full-time equivalence (FTE) the program was staffed with 15.5 teachers, 12 FTEs in elementary schools and 3.5 FTEs in middle schools. All teachers had at least a bachelor's degree and 20 teachers (64.5%) had a master's degree. The average number of years of teaching experience was 21.4 overall, and 9.3 in Title I/Chapter 1 teaching experience.

Parent Involvement Information. The Parent Involvement Form provided information from teachers at the end of each month (September 1987 through June 1988) concerning program activities involving parents who had children in the program. These data are presented by month in Table 5. Because teachers served pupils in both the MIC-CAI and the CLEAR-CAI programs, parent involvement data had to be prorated between the two programs. This accounts for the fractional "Number of Parents" encountered in Table 5. The months showing the most and least parent involvement were October, with a total of 416.0 contacts in 302.0 parent hours, and April, with a total of 56.5 contacts in 30.2 parent hours.

Table 3

Minimum, Maximum, Average, and Standard Deviation of the Pretest and Posttest Normal Curve Equivalents (NCE) for MIC-CAI Programs Reported by Grade Level 1987-88

Grade	Number of Pupils	Pretest				Posttest				Average Change
		Min.	Max.	Average NCE	Standard Deviation	Min.	Max.	Average NCE	Standard Deviation	
3	82	1.0	50.0	24.2	11.8	3.0	85.0	45.6	16.4	21.4
4	199	5.0	62.0	24.7	13.0	1.0	99.0	44.2	18.6	19.5
5	177	8.0	65.0	32.1	10.9	7.0	91.0	46.5	14.0	14.4
6	96	1.0	69.0	26.2	13.4	1.0	89.0	33.4	16.8	7.2
Total	554			27.2	12.7			43.3	17.2	16.0

Table 4

Number and Percent of Pupils in Change Categories for NCE Scores for MIC-CAI Programs Reported by Grade Level 1987-88

	Change Categories for NCE Scores			
	No Improvement (0.0 or less)	Some Improvement (0.1 to 6.9)	Substantial Improvement (7.0 or more)	Total Pupils in Sample
Grade 3				
Number of Pupils	9	7	66	82
% of Pupils	11.0%	8.5%	80.5%	14.8%
Grade 4				
Number of Pupils	25	19	155	199
% of Pupils	12.6%	9.5%	77.9%	35.9%
Grade 5				
Number of Pupils	28	27	122	177
% of Pupils	15.8%	15.3%	68.9%	31.9%
Grade 6				
Number of Pupils	27	17	52	96
% of Pupils	28.1%	17.7%	54.2%	17.3%
Total Group				
Number of Pupils	89	70	395	554
% of Pupils	16.1%	12.6%	71.3%	100.0%

Table 5

Number of Parents Involved and Total Parent Hours
for MIC-CAI Programs Reported by Month
1987-88

Program Activities	Months										Totals for Year
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	
1. Parents involved in the planning, operation and/or evaluation of your unit											
Number of Parents	92.0	6.0	4.5	4.0	3.0	6.5	1.5	4.0	5.5	4.0	131.0
Total Parent Hours	2.7	3.5	3.8	5.2	2.0	7.8	1.5	3.5	5.7	3.3	39.0
2. Group meetings for parents											
Number of Parents	176.0	216.0	20.5	17.0	6.0	14.5	44.5	8.5	34.5	20.5	558.0
Total Parent Hours	186.7	236.5	38.8	34.5	5.7	24.2	57.5	7.2	35.5	13.5	640.1
3. Individual parent conferences											
Number of Parents	50.0	95.5	185.5	36.0	51.0	93.5	40.5	34.0	55.0	46.5	687.5
Total Parent Hours	11.8	26.3	78.2	11.7	14.8	43.3	16.3	13.5	17.0	10.5	243.4
4. Parental classroom visits or field trips											
Number of Parents	15.0	98.0	15.5	31.5	9.5	6.0	14.0	7.0	20.5	20.5	237.5
Total Parent Hours	4.5	35.5	4.0	12.8	4.5	5.2	8.8	3.2	8.8	8.0	95.3
5. Visits by teacher to parents' homes											
Number of Parents	0.5	0.5	1.0	0.0	0.0	0.5	0.5	3.0	2.0	4.0	12.0
Total Parent Hours	0.0	0.2	0.5	0.0	0.0	0.3	0.2	2.8	1.5	3.2	8.7
Total Parent Contacts	333.5	416.0	227.0	88.5	69.5	121.0	101.0	56.5	117.5	95.5	1626.0
Total Parent Hours	205.7	302.0	125.3	64.2	27.0	80.8	84.3	30.2	68.5	38.5	1026.5

Note. Data were prorated between the MIC-CAI and CLEAR-CAI Programs.

Individual parent conferences accounted for more parent contacts (687.5) than any other activity. Yearly totals for the other activities were: group meetings with parents, 558.0 contacts in 640.1 parent hours; parent classroom visits or field trips, 237.5 contacts in 95.3 parent hours; planning, operation, and/or evaluation, 131.0 contacts in 39.0 parent hours; and visits by the teacher to parents' homes, 12.0 contacts in 8.7 parent hours. The yearly totals for all five types of parent activity were 1626.0 parent contacts in 1026.5 parent hours. Because a parent could have involvement in more than one contact, a yearly unduplicated count was also obtained from program teachers in June. This count indicated a total of 586 different parents of program pupils had one or more contacts with the program during the school year.

A separate end-of-the-year teacher survey was used to determine program involvement by nonprogram parents. This survey indicated that during the school year approximately 234.5 additional parents who did not have children in the program were involved in 276.5 contacts with the program in 244.5 parent hours.

Inservice Evaluation Information. The General Inservice Evaluation Form was completed by MIC-CAI teachers for three of the four inservice sessions which occurred from September 1987 through May 1988. With the exception of the Opening Conference, all of the mathematics inservice meetings were for the middle school teachers (see Table 1). Participants were asked after each session to rate four statements about the inservice on the following 5-point scale:

5 = Strongly Agree
4 = Agree
3 = Undecided
2 = Disagree
1 = Strongly Disagree.

Generally, workshop participants rated Chapter 1 inservice meetings positively. The average responses to the four inservice statements ranged from 4.3 to 4.5 on the 5-point scale. Overall ratings by participants are summarized in Table 6.

Open-ended questions on the General Inservice Evaluation Form asked participants to comment about the most and least valuable parts of the meetings, and about information they would like to have covered in future meetings. Only those open-ended comments which were made by four or more participants at any single session are summarized here. However, the evaluation reports on individual sessions have been submitted to the Department of Federal and State Programs and are available on request.

The following two items were identified by 4 or more MIC-CAI teachers as being the most valuable parts of the inservice meetings: the mini-sessions at the Opening Conference (particularly those conducted by Chapter 1 Coordinators and the Department of Evaluation Services); and the sharing of information, ideas, problems, and solutions at the Mathematics Workshop.

Only one item was mentioned by 4 or more teachers regarding the least valuable parts of meetings. This item was the keynote speaker/large group session at the Opening Conference. Specific comments about the keynote speaker mentioned the following: little new information, made little preparation, and not inspiring.

The only topic for future meetings that was suggested by 4 or more teachers was having make-it-take-it workshops. One teacher requested a make-it-take-it workshop especially for mathematics teachers with Dolphin labs and another requested a workshop focusing on more ideas for mathematics games.

Table 6

Number Responding, Average Response, and Percent of Response For Reactions to Inservice Statements for MIC-CAI Programs 1987-88

Statements	Number Responding	Average Response	Percent SA (5)	A (4)	U (3)	D (2)	SD (1)
1. I think this was a very worthwhile meeting.	34	4.3	44.1	44.1	5.9	5.9	0.0
2. The information presented in the meeting will assist me in my program.	34	4.5	55.9	35.3	8.8	0.0	0.0
3. There was time to ask questions pertaining to the presentation.	34	4.3	47.1	44.1	2.9	0.0	5.9
4. Questions were answered adequately.	33	4.3	42.4	48.5	3.0	6.1	0.0

Computer Census Information. To supplement the data collection specified in the evaluation design, information was obtained from all teachers in the MIC-CAI programs by means of a Computer Census Form (Chamberlain, 1988). This questionnaire was mailed in February and was completed by all MIC-CAI teachers by March 1988. Data from the Computer Census Form are presented in Table 7.

Of the 24 elementary labs, 22 had Apple microcomputers that were serviced by the Prescription Learning Company. Prescription Learning (PL) elementary labs were each equipped with 6 Apple microcomputers, one of which is used for the teacher's in-lab management system and for hands-on testing. The PL elementary labs were used a half-day for the instruction of MIC-CAI pupils, and a half-day for the instruction of CLEAR-CAI pupils.

The remaining 2 elementary labs (in one school) were serviced by the Computer Curriculum Corporation (CCC). A central CCC microhost was hooked up to the individual microcomputers in the 2 labs. Each lab had a total of 8 microcomputers for pupil use: 4 Apple and 4 Atari. In addition, each lab had a 5th Atari which was used as a teacher management system. Pupils in both the MIC-CAI and the CLEAR-CAI programs were served in these 2 labs.

Some of the computer systems that were in the elementary school labs used only for CLEAR-CAI pupils were not found in the labs used for MIC-CAI pupils (Chamberlain, 1988). Specifically, none of the elementary labs serving MIC-CAI pupils had Tandy TRS-80 color microcomputers, serviced by the B&B Company, nor the Sperry Network System, serviced by Wasatch.

Of the 7 middle school labs, 6 had Dolphin computers that were serviced by the Houghton-Mifflin Company. Each Dolphin lab consisted of a Dolphin minicomputer with 7 student terminals, plus a command module terminal which can also be used as another student station.

One middle school lab had Wasatch equipment. The Wasatch lab networked 4 Sperry microcomputers and 1 AT&T microcomputer as student stations. plus an additional Sperry microcomputer which was limited to teacher use as a command module. All 7 middle school labs served pupils in both the MIC-CAI and the CLEAR-CAI programs.

Table 7

Number of Labs, Average Pupil Time at the Computer and in the Program, and Percent Computer Time by Type of Lab for MIC-CAI Programs 1987-88

Type of Lab	Number of Labs	Average Minutes Per Week At Computer	Average Minutes Per Week In Program	Average Percent Computer Time
Elementary				
PL	22	86.1	214.3	40.2
TRS-80	0	-	-	-
CCC	2	187.5	225.0	83.3
Wasatch	0	-	-	-
Subtotal	24	94.6	215.2	43.9
Middle School				
Dolphin	6	95.0	211.7	44.9
Wasatch	1	150.0	200.0	75.0
Subtotal	7	102.9	210.0	49.0
Total	31	96.5	214.0	45.1

Note. Adapted from Chamberlain, 1988.

Overall, MIC-CAI pupils received 45.1% of their instruction at the computer stations. Observations and interviews conducted in previous years (Chamberlain, 1988) suggest that a variety of teacher-directed individual and group activities would account for the remaining program time. It is notable, however, that the average percent pupil computer time was considerably greater for the labs equipped with two of the computer systems; CCC (83.3%) and Wasatch (75.0%).

Middle School Pilot Program (MIC-Pilot)

Pupils were selected for the MIC-Pilot program on the basis of previous achievement test scores which indicated they were achieving at or below the 36th percentile in mathematics skills. Selection testing occurred prior to the program pretest.

Pupil Census Information. During the 1987-88 school year the MIC-Pilot program served a total of 210 pupils in grades 6-7 for an average of 1.8 hours of instruction per week.

The average daily membership in the MIC-Pilot program was 88.5 pupils. The average days of enrollment per pupil was 51.9 days. Enrollment days were the days in which pupils were scheduled to receive instruction. The average attendance per pupil was 41.9 days. The average number of pupils served during the school year per teacher by the 4 MIC-Pilot teachers was 52.5, although the average number of pupils enrolled per teacher on any given day was 22.1 (average daily membership divided by 4 teachers). The enrollment and attendance criteria were met by 148 pupils, or 70.5% of all program enrollees. Data pertaining to enrollment and attendance are presented in Table 8.

The evaluation sample was limited to those pupils who were English-speaking, had both pretest and posttest administrations of the standardized achievement test, met the enrollment criterion of at least 20 instructional days, and met the attendance criterion of at least 80% of their individual instructional periods.

Of the 210 pupils served, none were non-English speaking. The number of pupils excluded from the evaluation sample due to incomplete test data and/or nonattainment of the enrollment/attendance criteria was 81. The evaluation sample was comprised of the remaining 129 pupils, which was 61.4% of the 210 pupils served. Data from testing are presented in Tables 9 and 10.

Pupil census information also included the teacher's judgment of individual pupil progress as much, some, little, or no progress. Of the 210 pupils served in the program 36 (17.1%) were perceived by their program teachers as making much progress, 100 (47.6%) as making some progress, 59 (28.1%) as making little progress, and 15 (7.1%) as making no progress.

Standardized Achievement Test Information. As mentioned previously, normal curve equivalents (NCEs) are generally considered to provide the truest indication of pupil growth in achievement because they provide comparative information in equal units of measurement. Data for normal curve equivalents are presented in Table 9. The average NCE change from pretest to posttest for the MIC-Pilot program was 14.6 NCE points. The average NCE change per calendar month in the 6.2 month instructional period between pretest and posttest was 2.4 NCE points, which exceeded the evaluation objective for mathematics of 1.0 NCE point for each month of instruction. Moreover, the evaluation objective was exceeded

Table 8

Number of Pupils Served; Averages for Days of Enrollment, Days of Attendance, Daily Membership, and Hours of Instruction Per Week; and Pupils Meeting Enrollment and Attendance Criteria for MIC-Pilot Program Reported by Grade Level 1987-88

Grade	Pupils Served	Girls	Boys	Average				Pupils Meeting Enrollment and Attendance Criteria
				Days of Enrollment[a]	Days of Attendance	Daily Membership	Hours of Instruction per Pupil per Week[b]	
6	125	53	72	50.8	41.7	51.6	1.8	87
7	85	45	40	53.4	42.3	36.9	1.8	61
Total	210	98	112	51.9	41.9	88.5	1.8	148

[a]Days of enrollment were days in which pupils were scheduled to receive MIC-Pilot instruction.
[b]Pupils in one school received approximately 3.5 hours of instruction every other week.
Data from some schools were adjusted to compensate for inadvertent errors made on some Pupil Census Forms.

Table 9

Minimum, Maximum, Average, and Standard Deviation of the Pretest and Posttest Normal Curve Equivalents (NCE) for MIC-Pilot Program Reported by Grade Level 1987-88

Grade	Number of Pupils	Pretest				Posttest				Average Change
		Min.	Max.	Average NCE	Standard Deviation	Min.	Max.	Average NCE	Standard Deviation	
6	79	1.0	54.0	27.2	12.5	4.0	73.0	42.4	14.8	15.1
7	50	3.0	50.0	28.5	12.1	10.0	80.0	42.2	13.9	13.7
Total	129			27.7	12.3			42.3	14.4	14.6

in both grades 6 and 7, although the amount of change was greater for grade 6 than for grade 7. The average mathematic growth in grade 6 was 15.1 NCE points overall, or 2.4 NCE points per calendar month; and the growth in grade 7 was 13.7 NCE points overall, or 2.2 NCE points per calendar month. Furthermore, it should be noted that in this 6.2 month period of possible instruction between pretest and posttest, pupils did not receive instruction every day. They were served an average of 2.5 class periods per week (the equivalent of 1 class period every other day).

Again, it should be kept in mind that NCEs are based on percentiles, which compare the pupil's performance in relation to the general population. No change in NCE score from pretest to posttest does not denote a lack of absolute progress; on the contrary, it means that over the school year the pupil has progressed at the expected rate of growth and has maintained the same relative position in terms of the general population. Even a small gain in NCEs indicates an advancement from the pupil's original position relative to the general population. For readers interested in percentile and grade equivalent statistics, see Tables A-3 and A-4 in Appendix A.

Table 10 contains data related to the changes in NCE scores for the three ranges: (a) no improvement in NCE scores (0.0 or less), (b) some improvement in NCE scores (0.1 to 6.9), and (c) substantial improvement in NCE scores (7.0 or more). The data indicate that 110 pupils (85.3%) made gains in NCE scores. This means that 85.3% of the pupils in the evaluation sample progressed at a rate that was greater than expected for them. More specifically, 91 pupils (70.5%) made substantial improvement; 19 pupils (14.7%) made some improvement; and 19 pupils (14.7%) made no improvement, as evidenced by a gain of 0.0 or a decline in NCE scores.

ECIA Chapter 1 Teacher Census Information. Teacher Census Forms were completed in September 1987 by the 4 teachers assigned full-time to the MIC-Pilot program. All teachers had at least a bachelor's degree and 2 teachers (50.0%) had a master's degree. The average number of years of teaching experience was 16.0 overall, and 1.0 in Title I/Chapter 1 teaching experience.

Parent Involvement Information. The Parent Involvement Form provided information from teachers at the end of each month (September 1987 through June 1988) concerning program activities involving parents who had children in the program. These data are presented by month in Table 11. The months showing the most and least parent involvement were June, with a total of 51.0 contacts in 13.0 parent hours, and September, with a total of 1.0 contact in 0.5 parent hour. Individual parent conferences accounted for more parent contacts (108.0) than any other activity. Yearly totals for the other activities were: planning operation, and/or evaluation, 34.0 contacts in 10.5 parent hours; group meetings with parents, 30.0 contacts in 26.5 parent hour; parent classroom visits or field trips, 5.0 contacts in 1.0 parent hour; and visits by the teacher to parents' homes, no contacts. The yearly totals for all five types of parent activity were 177.0 parent contacts in 90.0 parent hours. Because a parent could have involvement in more than one contact, a yearly unduplicated count was also obtained from program teachers in June. This count indicated a total of 98 different parents of program pupils had one or more contacts with the program during the school year.

A separate end-of-the-year teacher survey was used to determine program involvement by nonprogram parents. This survey indicated that during the school year an additional 40 parents who did not have children in the program were involved in 58.0 contacts with the program in 18.5 parent hours.

Table 10

Number and Percent of Pupils in Change Categories for NCE Scores for MIC-Pilot Program Reported by Grade Level 1987-88

	Change Categories for NCE Scores			Total Pupils in Sample
	No Improvement (0.0 or less)	Some Improvement (0.1 to 6.9)	Substantial Improvement (7.0 or more)	
Grade 6				
Number of Pupils	8	15	56	79
% of Pupils	10.1%	19.0%	70.9%	61.2%
Grade 7				
Number of Pupils	11	4	35	50
% of Pupils	22.0%	8.0%	70.0%	38.8%
Total Group				
Number of Pupils	19	19	91	129
% of Pupils	14.7%	14.7%	70.5%	100.0%

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Table 11

Number of Parents Involved and Total Parent Hours
for MIC-Pilot Program Reported by Month
1987-88

Program Activities	Months										Totals for Year
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	
1. Parents involved in the planning, operation and/or evaluation of your unit											
Number of Parents	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	30.0	34.0
Total Parent Hours	0.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	2.5	10.5
2. Group meetings for parents											
Number of Parents	0.0	6.0	5.0	0.0	0.0	1.0	5.0	0.0	0.0	13.0	30.0
Total Parent Hours	0.0	9.0	5.0	0.0	0.0	0.5	5.5	0.0	0.0	6.5	26.5
3. Individual parent conferences											
Number of Parents	1.0	22.0	19.0	4.0	6.0	15.0	17.0	10.0	6.0	8.0	108.0
Total Parent Hours	0.5	8.5	9.0	1.5	2.5	8.0	11.0	4.5	2.5	4.0	52.0
4. Parental classroom visits or field trips											
Number of Parents	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	5.0
Total Parent Hours	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.0
5. Visits by teacher to parents' homes											
Number of Parents	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Parent Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Parent Contacts	1.0	32.0	24.0	8.0	6.0	16.0	22.0	10.0	7.0	51.0	177.0
Total Parent Hours	0.5	18.0	14.0	9.5	2.5	8.5	16.5	4.5	3.0	13.0	90.0

Inservice Evaluation Information. The General Inservice Evaluation Form was completed by program teachers for all three of the inservice sessions for MIC-Pilot teachers which occurred from September 1987 through May 1988. Participants were asked after each session to rate four statements about the inservice on the following 5-point scale:

5 = Strongly Agree
4 = Agree
3 = Undecided
2 = Disagree
1 = Strongly Disagree.

Generally, workshop participants rated Chapter 1 inservice meetings positively. The average responses to the four inservice statements ranged from 4.8 to 4.9 on the 5-point scale. Overall ratings by participants are summarized in Table 12.

Table 12

Number Responding, Average Response, and Percent of Response For Reactions to Inservice Statements for MIC-Pilot Program 1987-88

Statement	Number Responding	Average Response	Percent SA (5)	A (4)	U (3)	D (2)	SD (1)
1. I think this was a very worthwhile meeting.	9	4.9	88.9	11.1	0.0	0.0	0.0
2. The information presented in the meeting will assist me in my program.	9	4.8	77.8	22.2	0.0	0.0	0.0
3. There was time to ask questions pertaining to the presentation.	9	4.8	88.9	0.0	11.1	0.0	0.0
4. Questions were answered adequately.	8	4.9	87.5	12.5	0.0	0.0	0.0

Open-ended questions on the General Inservice Evaluation Form asked participants to comment about the most and least valuable parts of the meetings, and about information they would like to have covered in future meetings. Open-ended comments are not summarized here since the content of responses varied from participant to participant. No item was mentioned by more than one participant at any single session. However, the evaluation reports on inservice meetings have been forwarded to the Department of Federal and State Programs and are available on request.

Summary/Recommendations

The Mathematics Improvement Component (MIC) provided supplementary instruction to selected elementary and middle school pupils who were low achievers in mathematics. The purpose of MIC was to improve mathematics skills and levels of achievement. Three programs comprised MIC: the Elementary Program, the Middle School Program, and the Middle School Pilot Program. In the first two (nonpilot) programs, selected pupils were served in computer-assisted-instruction (CAI) labs for 1 class period per day (i.e., 5 periods per week) for the entire school year. In the pilot program selected pupils were served an average of 2.5 class periods per week and were allowed to move in and out of the program as needed during the school year. The programs are summarized in more detail below.

Elementary and Middle School Programs (MIC-CAI)

The MIC-CAI programs were located in computer-assisted-instruction labs in 22 elementary schools and 7 middle schools. A total of 883 pupils in grade 2-6 were served by the 31 half-time MIC-CAI teachers. Of the 883 pupils, 701 were in elementary schools and 182 were in middle schools. The average number of MIC-CAI pupils served during the school year per teacher was 28.5. The average number of MIC-CAI pupils enrolled per teacher on any given day was 24.6. These numbers are less than the maximum of 30 pupils that could be served during the half-day the lab was used for MIC-CAI instruction. The average amount of instruction per week was 3.6 hours, which is greater than the 3.3 hours per week, i.e., 40 minutes per day, specified in the ECIA Chapter 1 proposal.

The evaluation sample consisted of 554 pupils in grades 3-6 who were English-speaking, met the attendance criterion, and took the pretest and posttest. Analyses of the CTBS Total Mathematics scores indicated an average change of 16.0 NCE points for the 6.2 month instructional period between pretest and posttest, or 2.6 NCE points per month of instruction. Results exceeded the evaluation objective for mathematics growth of 1.0 NCE point for each month of instruction. Moreover, the objective was exceeded in each grade represented in the sample, although the amount of change varied inversely with grade level. The average mathematics growth per month of instruction was 3.5 NCE points in grade 3, 3.1 NCE points in grade 4, 2.3 NCE points in grade 5, and 1.2 NCE points in grade 6.

The total number of program teachers was 31, each serving half-time in a MIC-CAI program (15.5 FTEs) and half-time in a CLEAR-CAI program. All teachers had at least a bachelor's degree and 20 teachers (64.5%) had a master's degree. Program teachers reported an average of 9.3 years of Title I/Chapter 1 teaching experience and an average of 21.4 years of overall teaching experience.

Program teachers reported a total of 1626.0 contacts during the school year with 586 different parents of program pupils. The number of contacts and hours varied by month. Individual parent conferences accounted for more parent contacts than any other type of activity.

Evaluation forms were completed for three of the four inservice meetings. The meetings were rated highly with the average responses ranging from 4.3 to 4.5 on the 5-point scale.

A survey of program teachers indicated that most of the elementary CAI labs had Apple microcomputers serviced by Prescription Learning Company and most of

the middle school CAI labs had Dolphin minicomputers. The exceptions were 2 elementary labs that had CCC computers and 1 middle school lab that had Wasatch computers. According to teacher reports, the overall average amount of time pupils worked at the computer stations was 45.1% of program instructional time. The percent was much higher for the few labs equipped with CCC or Wasatch computers.

Based on the evaluation results, it is strongly recommended that the MIC-CAI programs be continued during the 1988-89 school year, with special consideration given to the following:

1. To determine ways of further improving program effectiveness and efficiency, variations in program implementation (e.g., the use of different types of instructional methods, computer equipment, the percent of pupil time at a computer station) should be studied across schools.

2. In the second year of the program (1988-89) efforts should be made to improve the mathematics growth in the upper grade levels. For example, the 1987-88 growth of 1.2 NCE points per month of instruction in grade 6 exceeded the evaluation objective of 1.0 NCE point per month, but this amount of growth was much less than the 3.5 NCE points per month of instruction achieved in grade 3.

3. The MIC-CAI programs and the MIC-Pilot program represent two different models of service delivery for pupils who are low achievers in mathematics. Comparisons of pupil performance in the MIC-CAI programs with pupil performance in the MIC-Pilot program would be desirable in the future. For example, does one model achieve greater NCE growth in relation to the number of pupils served and/or the amount of instructional time? Is one model more cost-effective than the other? Currently such comparisons are problematic because the programs differ with regard to a number of variables (e.g., grade levels served, pupil characteristics, teacher training, teacher experience, amount of instructional time, types of instructional methods). Thus, it would be difficult to attribute differences in pupil performance to any specific variable(s). Staff members should be encouraged to review and suggest modifications in the proposed ECIA Chapter 1 program design within the Mathematics Improvement Component to enable valid comparisons of pupil performance for the two models. If valid comparisons can be made, Chapter 1 services can be targeted to best meet the needs of low achievers in mathematics.

Middle School Pilot Program (MIC-Pilot)

A total of 210 pupils in grades 6-7 were served in the 4 middle schools in the MIC-Pilot program. The average number of pupils served during the school year per teacher was 52.5. This number is less than the approximately 60 pupils that could be served during the school year. The average number of pupils enrolled per teacher on any given day was 22.1. The average amount of instruction per week was 1.8 hours, which was greater than the 1.1 hours per week (i.e., 80 minutes per six-school-day cycle) specified in the ECIA Chapter 1 proposal. The number of pupils who actually moved in and out of the program and then into the program a second time could not be determined.

The evaluation sample consisted of 129 pupils in grades 6-7 who were English-speaking, met the enrollment and attendance criteria, and took the

pretest and posttest. Analyses of the CTBS Total Mathematics scores indicated an average change of 14.6 NCE points for the 6.2 month instructional period between pretest and posttest, or 2.4 NCE points per month of instruction. Results exceeded the evaluation objective for mathematics growth of 1.0 NCE point for each month of instruction. Moreover, the objective was exceeded in both grades. The average mathematics growth per month of instruction was 2.4 NCE points in grade 6 and 2.2 NCE points in grade 7.

The 4 MIC-Pilot teachers served full-time in the program. Of the 4 teachers, 2 had a bachelor's degree and 2 had a master's degree. The teachers reported an average of 1.0 year of Title I/Chapter 1 teaching experience and an average of 16.0 years of overall teaching experience.

Program teachers reported a total of 177.0 contacts during the school year with 98 different parents of program pupils. The number of contacts and hours varied by month. Individual parent conferences accounted for more parent contacts than any other type of activity.

The three inservice meetings were rated highly by program teachers on the Inservice Evaluation Forms. The average responses ranged from 4.8 to 4.9 on the 5-point scale.

Based on the evaluation results, it is strongly recommended that the MIC-Pilot program be continued during the 1988-89 school year with special consideration given to the following:

1. To determine ways of further improving program effectiveness and efficiency, variations in program implementation (e.g., selection procedures, service delivery patterns, instructional methods, communication with classroom teachers, testing procedures, movement in and out of the program) should be studied across schools.

2. The nature and amount of movement in and out of the program should be determined because it is a key aspect of the program.

3. As stated above, the MIC-Pilot program and the MIC-CAI programs represent two different models of service delivery for pupils who are low achievers in mathematics. Comparisons of pupil performance in the MIC-Pilot program with pupil performance in the MIC-CAI programs would be desirable in the future, but such comparisons are currently problematic because the programs differ with regard to a number of variables. Staff members should be encouraged to review and suggest modifications in the proposed ECIA Chapter 1 program design within the Mathematics Improvement Component to enable valid comparisons of pupil performance for the two models. If valid comparisons can be made, Chapter 1 services can be targeted to best meet the needs of low achievers in mathematics. [See recommendation 3 (above) for the MIC-CAI programs.]

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Appendix A

Additional Tables

Table A-1

Minimum, Maximum, Median, and Standard Deviation of the Pretest and Posttest Percentiles for MIC-CAI Programs Reported by Grade Level 1987-88

Grade	Number of Pupils	Pretest				Posttest			
		Min.	Max.	Median Percentile	Standard Deviation	Min.	Max.	Median Percentile	Standard Deviation
3	82	1.0	50.0	11.5	11.7	1.0	95.0	42.5	24.8
4	199	2.0	71.0	10.0	14.3	1.0	99.0	34.0	25.4
5	177	2.0	77.0	22.0	13.6	2.0	97.0	46.0	22.3
6	96	1.0	82.0	14.0	15.6	1.0	97.0	20.5	21.9

Table A-2

Minimum, Maximum, Median, and Standard Deviation
of the Pretest and Posttest Grade Equivalents
for MIC-CAI Programs Reported by Grade Level
1987-88

Grade	Number of Pupils	Pretest				Posttest			
		Min.	Max.	Median Grade Equivalent	Standard Deviation	Min.	Max.	Median Grade Equivalent	Standard Deviation
3	82	1.7	3.1	2.3	0.3	2.1	6.6	3.6	0.8
4	199	2.3	4.6	2.9	0.5	2.5	8.9	4.3	1.2
5	177	2.8	6.4	4.1	0.6	3.2	10.1	5.5	1.1
6	96	2.8	7.7	4.4	0.9	3.5	10.9	5.3	1.3

Table A-3

Minimum, Maximum, Median, and Standard Deviation of the Pretest and Posttest Percentiles for MIC-Pilot Program Reported by Grade Level 1987-88

Grade	Number of Pupils	Pretest				Posttest			
		Min.	Max.	Median Percentile	Standard Deviation	Min.	Max.	Median Percentile	Standard Deviation
6	79	1.0	58.0	15.0	13.4	1.0	86.0	38.0	22.7
7	50	1.0	50.0	13.0	15.1	3.0	92.0	35.0	21.6

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Table A-4

Minimum, Maximum, Median, and Standard Deviation
of the Pretest and Posttest Grade Equivalents
for MIC-Pilot Program Reported by Grade Level
1987-88

Grade	Number of Pupils	Pretest				Posttest			
		Min.	Max.	Median Grade Equivalent	Standard Deviation	Min.	Max.	Median Grade Equivalent	Standard Deviation
6	79	2.8	6.4	4.5	0.8	3.6	8.8	6.2	1.2
7	50	4.0	7.0	5.0	1.0	4.2	10.9	7.0	1.4

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Appendix B

Instruments

COLUMBUS PUBLIC SCHOOLS Columbus, Ohio PUPIL CENSUS FORM

LAST NAME FIRST NAME M.I. SEX TEACHER NUMBER

SCHOOL R.R. GRADE

USE A NUMBER 2 PENCIL. ERASE COMPLETELY WHEN MAKING CORRECTIONS.

WAS THIS A "NON-ENGLISH SPEAKING" STUDENT?
YES NO

DID THIS PUPIL BECOME QUALIFIED FOR A SPECIAL ED. PROGRAM?
YES NO

HOW DID YOU FEEL THIS PUPIL PROGRESSED WHILE IN YOUR PROGRAM?
MUCH PROGRESS SOME PROGRESS LITTLE PROGRESS NO PROGRESS

32

TEACHER NUMBER

PROGRAM CODE

STUDENT

SCHOOL

GRADE

SEX
MALE
FEMALE

TOTAL DAYS OF PROGRAM ENROLLMENT 1 2 3

TOTAL DAYS OF PROGRAM ATTENDANCE 4 5 6

HOURS OF INSTRUCTION PER WEEK

NCS Trans Optic 08 8153 3

47

48

1987-88
Teacher Census Form

Social Security Number ___ ___ ___-___ ___-___ ___ ___ ___

Name_____ Program Code_____

School Assignment_____ Cost Center _____

Circle only the program you are in:

ECIA Chapter 1 Programs:
(1) ADK
(2) CLEAR-Elementary (1-5)
(3) CLEAR-Elementary-CAI (4-5)
(4) CLEAR-Middle School (6-8)
(5) CLEAR-Middle-CAI (6-8)
(6) MIC-Elementary-CAI
(7) Pilot Math Program-Middle School

DPPF Programs:
(6) SDR (9-10)
(7) SDR-CAI (9-10)
(8) HSCA
Other (Specify)_____

[a]Number of Years of Teaching Experience_____

[b]Number of Years of Title I/Chapter 1 Teaching Experience_____

[c]I am certified in reading as indicated by the subject area on my teaching certificate.

_____Yes _____No

Highest College Degree Received_____

Full-Time Employee_____
or
Part-Time Employee_____

- -

[a]Total all years of experience, including those which may have occurred outside of the City of Columbus. Please include present school year.

[b]1. For every full year taught in Title I/Chapter 1 give yourself 10 months experience. Please include the present school year.

2. For every summer term you taught in Title I give yourself two months experience.

3. Add in any miscellaneous experience, a part-year perhaps.

4. Add the totals for 1, 2, and 3 and divide by 10. Place the resulting quotient in the blank for question b above.

[c]Certification is defined as having one of the following:

1. reading specified on Bachelor degree.

2. reading specialist certificate.

3. M.A. in reading as a subject.

CHAPTER 1 EVALUATION
PARENT INVOLVEMENT SURVEY

mailing label
goes here

Name _____

School _____

For the month of SEPTEMBER, 1987

	(A) Number of Parents	(B) Total Number of Hours
1. Parents involved in the planning, operation, and/or evaluation of your unit	_____	____.__
2. Group Meetings for Parents	_____	____.__
3. Individual Parent Conferences	_____	____.__
4. Parental Classroom Visits or Field Trips	_____	____.__
5. Visits by you to Parent Homes	_____	____.__
6. Totals	_____	____.__
7. Estimated Unduplicated Count of Parents	_____	

DIRECTIONS:
1. Complete all information, fold over so back is showing, staple, and place in school mail.
2. Place a parent in only one activity for any one meeting.
3. Total hours equals the number of parents times the number of hours spent, e.g., a group meeting for 10 parents which lasts 3 hours would result in 10 parents (Column A) and 30.0 hours (Column B), 15 parent conferences each for 30 minutes would result in 15 parents and 7.5 hours. Please round all figures in Column B to the nearest half hour. Enter half hours as .5, no fractions please.
4. Item 7 - This is the number of different parents seen, not the total in 6A. If you had 16 parent conferences but 10 conferences were with the same parent, the unduplicated count is 7 parents - you saw 7 parents but had 16 conferences. Do not count a parent more than once. The figure in Item 7A can never exceed the figure for Item 6A.

Please return by Friday, October 9, 1987.

[redacted]/KATHY.PIP

Mailing Label Here

CHAPTER 1 EVALUATION
PARENT INVOLVEMENT SURVEY

_____ ANNUAL UNDUPLICATED COUNT	IMPORTANT Enter on the line to the left the annual unduplicated count of parents you had involved in any of the Activities 1-5 below. COUNT EACH PARENT ONLY ONCE FOR THE YEAR. If you have questions regarding this count, please call Sharon Bermel at 222-3011 or bring your question(s) to the end-of-the-year inservice meeting.

COMPLETE THE REST OF THIS REPORT FOR JUNE ONLY

Activities	(A) Number of Parents	(B) Total Number of Hours
1. Parents involved in the planning, operation, and/or evaluation of your unit	_____	____.__
2. Group Meetings for Parents	_____	____.__
3. Individual Parent Conferences	_____	____.__
4. Parental Classroom Visits or Field Trips	_____	____.__
5. Visits by you to Parent Homes	_____	____.__
6. Totals	_____	____.__
7. Estimated Unduplicated Count of Parents	_____	

DIRECTIONS:

1. Complete all information, fold over so back is showing, staple, and place in school mail.
2. Place a parent in only one activity for any one meeting.
3. Total hours equals the number of parents times the number of hours spent, e.g., a group meeting for 10 parents which lasts 3 hours would result in 10 parents (Column A) and 30.0 hours (Column B), 15 parent conferences each for 30 minutes would result in 15 parents and 7.5 hours. Please round all figures in Column B to the nearest half hour. Enter half hours as .5, no fractions please.
4. Item 7 - This is the number of different parents seen, not the total in 6A. If you had 16 parent conferences but 10 conferences were with the same parent, the unduplicated count is 7 parents - you saw 7 parents but had 16 conferences. Do not count a parent more than once. The figure in Item 7A can never exceed the figure in Item 6A.

RETURN RIGHT AWAY BUT NO LATER THAN FRIDAY, JUNE 3, 1988

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CHAPTER 1 EVALUATION
PARENT INVOLVEMENT SURVEY

SCHOOL YEAR ESTIMATE OF PARENTS

NON-CHAPTER 1 STUDENTS

Name _____

School _____

Activities	(A) Number of Parents	(B) Number of Parent Hours
1. Parents involved in the planning, operation, and/or evaluation of your unit (do not include Parent Advisory Council members).	_____	____.__
2. Group Meetings for Parents (do not include Parent Advisory Council meetings).	_____	____.__
3. Individual Parent Conferences	_____	____.__
4. Parental Classroom Visits or Field Trips	_____	____.__
5. Visits by you to Parent Homes	_____	____.__
Estimated Unduplicated Count of Parents	_____	

DIRECTIONS: Please complete all information. Indicate a 0 if the number of parents or hours is actually zero--otherwise enter the number.

Column A (Number of Parents) lines 1-5: Please place a parent in only one activity for any one meeting.

Column B (Number of Parent Hours) lines 1-5: Indicate the sum of the hours each parent spent in an activity. For example, a group meeting with 10 parents which lasted 3 hours should result in a 10 on line 2, Column A and a 30.0 on line 2, Column B (each parent met with the teacher 3 hours and there were 10 parents). Please round all figures in Column B to the nearest half-hour. Enter half hours as .5, no fractions please.

For the Estimated Unduplicated Count of Parents do not count a parent more than once (even if a parent is listed in more than one activity).

After completing all the information on this survey, fold it so the back is visible, staple, and place it in the school mail.

Thank you.

EVALSRVCS/P513/KATHY.PIF

ECIA CHAPTER 1
ORIENTATION INSERVICE EVALUATION FORM
September 8, 1987

Circle only the program you are in:

ECIA Chapter 1 Programs:
(1) ADK
(2) CLEAR-Elementary (1-5)
(3) CLEAR-Elementary-CAI (4-5)
(4) CLEAR-Middle School (6-8)
(5) CLEAR-Middle-CAI (6-8)
(6) MIC-Elementary-CAI
(7) Pilot Math Program-Middle School

DPPF Programs:
(6) SDR (9-10)
(7) SDR-CAI (9-10)
(8) HSCA
Other (Specify)_____

Circle the number that indicates the extent to which you agree with statements 1-4, in rating the overall day of inservice.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1. I think this was a very worthwhile inservice.	5	4	3	2	1
2. The information presented in this inservice will assist me in my program.	5	4	3	2	1
3. There was time to ask questions pertaining to the presentations.	5	4	3	2	1
4. Questions were answered adequately.	5	4	3	2	1

Circle the number that indicates how you would rate each of the following portions of today's inservice in regard to interest and usefulness of presentations.

	Superior	Excellent	Good	Fair	Poor
5. Large Group Session					
a. Interest	5	4	3	2	1
b. Usefulness	5	4	3	2	1
6. Commercial Exhibits					
a. Interest	5	4	3	2	1
b. Usefulness	5	4	3	2	1
7. Mini-session with main speaker					
a. Interest	5	4	3	2	1
b. Usefulness	5	4	3	2	1

	Superior	Excellent	Good	Fair	Poor
8. Chapter 1 mini-session					
a. Interest	5	4	3	2	1
b. Usefulness	5	4	3	2	1
c. Clarity of instructions	5	4	3	2	1
9. Evaluation Presentation					
a. Interest	5	4	3	2	1
b. Usefulness	5	4	3	2	1
c. Clarity of instructions	5	4	3	2	1

10. What was the most valuable part of this meeting?_____

_____

11. What was the least valuable part of this meeting?_____

_____

12. What additional information or topics would you like to see covered in future meetings?

_____

_____

_____

GENERAL INSERVICE EVALUATION FORM

Inservice Topic: _____

Presenter(s): _____

Date: _____ (e.g., 03/05/88)

Session: _____a.m. and/or _____p.m.

Circle only the program you are in:

ECIA Chapter 1 Programs:
(1) ADK
(2) CLEAR-Reading Recovery
(3) CLEAR-Primary (Special Treatment)
(4) CLEAR-Elementary (1-5)
(5) CLEAR-Elementary-CAI
(6) CLEAR-Middle (6-8)
(7) CLEAR-Middle-CAI
(8) MIC-Elementary-CAI
(9) Math-Middle-Pilot
(10) MIC-Middle-CAI
Other (Specify)_____

DPPF Programs:
(11) SDR (9-10)
(12) SDR-CAI
(13) HSCA

Circle the number that indicates the extent to which you agree with statements 1-4.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1. I think this was a very worthwhile meeting.	5	4	3	2	1
2. The information presented in this meeting will assist me in my program.	5	4	3	2	1
3. There was time to ask questions pertaining to the presentation.	5	4	3	2	1
4. Questions were answered adequately.	5	4	3	2	1

5. What was the most valuable part of this meeting?_____

_____

6. What was the least valuable part of this meeting?_____

_____

7. What additional information or topics would you like to see covered in future meetings?_____

_____

_____

MEMO

TO: CLEAR, MIC, and SDR Teachers Using Computer-Assisted Instruction (CAI)

FROM: Ed Chamberlain (CLEAR-CAI and SDR-CAI evaluations)
Phyl Thomas (Mathematics program evaluations)

SUBJECT: Computer Systems Used in CAI Classrooms

DATE: February 12, 1988

Since there is a variety of different computer systems used in program classrooms, it becomes necessary for us to take a sort of census from time to time to determine the distribution of these computer systems. Please take a few minutes to complete the form below, fold and staple with the return mailing label showing, and return it in the school mail.

Teacher _____ School _____

Number of Computers or Terminals, by Type

___Apple
___TRS-80
___Microhost
___Sperry
___Dolphin
___PET
___Other _____

Company Servicing Computers (please check)

___Prescription Learning
___B&B
___CCC
___Wasatch
___Houghton-Mifflin
___None
___Other _____

Does your computer system include a command module/teacher management system? _____

How many computers (or terminals) are available for student work, not counting the Command Module? _____

Average number of minutes per week a pupil is served in the program

_____ (Reading program pupils) _____ (Math program pupils)

Average number of minutes per week a pupil works at a computer

_____ (Reading program pupil) _____ (Math program pupil)

Space for optional comments:

cc: Dick Amorose
Sharon Bermel
Rose Carbol
John Hilliard
Pat Huggard
Dick Snide
Dorothy Wilson